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Private Equity investment and the Post-IPO performance: Evidence from Brazil

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Abstract

Using a dataset comprising 108 Initial Public Offerings (IPOs) between 2005 and 2014, in Brazil, this dissertation studies the influence of Private Equity's investment in the companies' post-IPO performance. Following Ritter's (1991) methodology, two portfolios were created: one with Private Equity backed companies and another with no PE investment. Then, a "Buy and Hold" strategy was performed and the Cumulative Abnormal Returns (CAR) were studied. The main findings were that in this time span there is a loss in the stocks' returns of companies with recent IPOs and that it is indifferent if the IPOs are Private Equity backed or not, regarding their long-run performance.

Key Words: Cumulative Abnormal Returns; IPO; Post-IPO performance; Private Equity

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Introduction

Over the last decades, Private Equity (PE) has played an important role in Corporate Finance. According to ABVCAP (Associação Brasileira de Private Equity & Venture Capital), the Brazilian PE industry has grown substantially in the last years in terms of deals and volume (56,77% between 2011 and 2015) and has contributed to a considerable number of Initial Public Offerings (IPO) in the B3 - Brazil, Stock Exchange and Over-the-Counter Market (former BM&FBOVESPA – São Paulo's stock exchange).

I decided to do a research on this topic as the Brazilian Private Equity industry is still recent and so are IPOs in this country. Moreover, I chose this specific geography because I lived in Brazil and wanted to expand my knowledge regarding the emerging markets' reality. Finally, I chose an area that could combine a theoretical knowledge with a more practical one – namely with the kind of job that I would like to have in the future. Therefore, I wanted to write something that would be Private Equity related. Thus, the hypothesis tested in this dissertation is: ***Private Equity positively affects post-IPO performance***, with evidence from the Brazilian market.

When studying the relationship between Private Equity investment and post-IPO performance, Cao and Lerner (2009) found that that PE-backed IPOs outperformed the non-PE-backed IPOs and the market as a whole. Moreover, Brav and Gompers (1997), concluded that in the five-year time span following the Initial Public Offering, venture-backed IPOs outperformed non-venture-backed IPOs when using equal weighted returns, between 1972-1992.

In this dissertation, however, I could not reach the same conclusions for IPOs that occurred in Brazil between 2005 and 2014.

This thesis is divided in 5 chapters that provide both a qualitative and quantitative analysis that attempt to answer the research question. In chapter 1, one finds the literature review which forms the qualitative part of this study and describes the Private Equity industry, displays some

explanations regarding Initial Public Offerings and presents conclusions regarding the relationship between Private Equity investment and the post-IPO performance. Chapter 2 describes the research question and the hypothesis tested and chapter 3 contains both the data description and the methodology used to perform the empirical study. In chapter 4, an analysis of the empirics as well as a discussion of the results is displayed and in chapter 5 the main conclusions are exhibited and some suggestions for future research are provided.

1. Literature Review

The relationship between Private Equity and long-run performance has been studied by numerous investigators and some conclusions have been drawn, which will be summarized in this section.

1.1 Private Equity

1.1.1 Introduction to PE

Private Equity is a medium to long-term financial investment provided in return for equity in a company which capital is not listed on a public exchange.

PE firms, also known as General Partners (GP), raise capital through PE funds using large amounts of debt (up to 80%) *(Kaplan and Per Strömberg, 2008)*. These funds are limited partnerships in which the GP manages and the Limited Partners (LP) provide the capital that may be used to fund start-ups (venture capital), make acquisitions (growth equity or buyouts) or to strengthen balance sheets. The LPs can be both institutional investors - pension funds and insurance companies – or private investors such as foundations or wealthy individuals.

Usually, funds are "close-ended" and typically have a 10-year life but, if extended, can reach 13 years. In addition, the PE firms invest in the first five years and in the following five to eight years, return capital to the investors – period known as the "holding period".

Moreover, PE firms have return through three distinct forms: (1) management fees - usually, as a rule of thumb, are 1.5% to 2% of the capital committed *(Barwon Investment Partners, Listed*

PE vs Unlisted PE fees, 2014), (2) carried interests - 20% performance fees on committed capital and profit *(Metrick and Yasuda, 2010)* – and (3) deal and monitoring fees paid by the portfolio companies (see Figure 1. in the "Attachments" section).

In addition, the PE investment cycle comprises four stages. (1) It starts with screening investment opportunities. (2) Then, when the right ones are found, the GP must invest the capital provided by the LP on those. (3) Afterwards, the GP needs to manage the portfolio's assets well enough to create value. (4) That creation of value will be reflected in the exit process, where the PE stake is sold to other investors.

1.1.2 Main value drivers

Private Equity firms combine both financial and governance engineering and make some operational improvements to profit from the purchased companies *(Gompers, Kaplan and Mukharlyamov, 2015)*.

Financial engineering consists on optimizing the portfolio companies' capital structure through the reduction of marginal agency costs and minimizing its after-tax cost of capital – tax shield effect *(Berg & Gottschalg, 2005)* while governance engineering is the way that PE investors control the boards of their portfolio companies. PE investors are more actively involved in governance than public company boards (Kaplan and Stromberg, 2008). Regarding these two types of engineering, Kaplan (2009) concluded that both continue to be important, but not as differentiating as before. Hence, the best buyout firms have developed their operational engineering, which is defined as the industry and operating's expertise that PE firms apply to identify attractive investments, develop value creation plans for those investments, and to implement the value creation plans *(Kaplan and Stromberg, 2008)*.

1.1.3 PE Exits

Oppositely to a strategic buyer, PE firms look forward to exiting their investments, on average, in a 10 year-time *(Kerester and Kim, 2017)*. PE investors exit their investments in five ways:

(1) initial public offerings, (2) trade sales (or acquisitions), (3) secondary sales (or refinancing), (4) management buy-outs and (5) write-offs *(Cumming and Johan, 2013).*

The last two methods of exits are considered to be the least successful ones as they do not result in any significant capital into the firm. On the other hand, IPOs are considered to be the most successful method of exit for all parties due to the potential capital inflow into the firm and the potential profit to PE investors *(Black and Gilson, 1998).*

It is relevant to mention that the IPO stage is not the exit per se but only a pre-stage since the PE firm is frequently required to hold the shares after the IPO for a pre-determined lock-up period – contractual restriction that prevents insiders such as founders, owners or employees to sell the company's stock in the first 90 to 180 days after going public. When those shares are definitely sold on the stock market, then the exit takes place *(Schwienbacher, 2009)*.

1.1.4 PE industry in Brazil

Globally, Private Equity deals boosted in the "eighties", mainly through Leverage Buyouts since leveraging was cheap and the economic environment was favourable. However, in the following decade, the PE activity dropped firmly, until the 2000's when it rose again with the appearance of the secondary leverage buyouts *(Guo et al., 2011).*

In Brazil, the PE industry has accumulated more than three decades of experience, making it possible to examine the industry at the end of a complete PE investment and exit cycle *(Ribeiro and Carvalho, 2008)*. When comparing the Brazilian PE industry to the European and the North American ones, the main differences besides the size are that in Brazil there is a tendency to invest in more advanced stages of corporate development, there is an avoidance of leveraged transactions since leveraging is expensive, there is lack of sector specialization and firms are concentrated in the country's financial districts *(Ribeiro and Carvalho, 2008).*

Regarding the PE exits in Brazil, until 2004 were mostly through trade sales and buybacks and 2000 and 2001 were intense in write-offs, most likely due to the investment cycle of the dot.com

bubble *(Ribeiro and Carvalho, 2008)*. However, the number of IPOs increased after 2004 and it is expected that they will continue to be a major exit mechanism in the following years.

Finally, it is expected that in the near future, the industry continues to grow since there is a potential long-term GDP growth rate and conservative monetary policies, allowing Brazilian PE firms to consolidate industries, effecting operational improvements and explore different markets.

1.2 Initial Public Offerings

1.2.1 Introduction to the Initial Public Offerings

An IPO can be defined as the sale of a firm's securities in the form of shares for the first time and are an important source of financing for privately held companies through the access of public markets. As such, there are several reasons for a company to go public.

The first reason is access to new funds, allowing them to access the public equity markets for additional capital necessary to fund future growth, while simultaneously providing a venue for the initial shareholders to sell their ownership stake *(Kim and Weisbach, 2005)*.

The second one is that firms may benefit from a change in leverage after the IPO, since the new equity capital raised might be used to reduce leverage and not to finance more investment and growth *(Pagano, Panetta, & Zingales, 1998)*. Moreover, the enhancement on the companies' image and publicity that an IPO offers may work as a certification by the financial market professionals and can be used as a marketing tool *(Roells, 1996)*.

Finally, factors such as motivating management teams and employees, as well as cashing in, are also good reasons to go public *(Roells, 1996)*.

Nevertheless, there are also disadvantages such as: direct costs, underpricing, costs of information disclosure, constraints on the freedom of action in making business decisions and the danger of loss of control, namely by a hostile takeover from another company *(Roells,1996)*. However, the last one is unlikely to happen since controlling parties retain, on average, a

comfortable majority of voting rights several years after an IPO *(Pagano et al., 1995)*. Regarding performance, *Ritter (1991)* found that during 1975-84, companies that went public have significantly underperformed comparable firms in similar industries from the closing price on the first day of public trading to their three-year anniversaries, leading to the conclusion that in the long-run, IPO investments tend to do worse than the market.

1.2.2 Initial Public Offerings in Brazil

Ritter and Welch (2002) concluded that "market conditions are the most important factor in the decision to go public" and that when market conditions get worse, stock prices drop and IPO volume declines since private firms prefer to wait for more favourable market conditions before going public. This may be the reason why there was a lack of IPOs in Brazil until 2004, which was not specific to the Private Equity industry. Nevertheless, in the last years, there are have been many Private Equity backed companies going through an IPO which is an important signal that the Brazilian PE industry has the capacity to perform the whole investment cycle, by exiting through an IPO.

Moreover, the number of IPOs has risen from 2004 to 2007, but with the 2008 financial crisis, it slowed down again, as one will see in the data section of this study and in Graph 1 (in the "Attachments" section).

Finally, factors such as the GDP growth, low interest rates, low inflation and the raise of credit conceded by the financial institutions (oppositely to the European and North American markets) may suggest that in the near future there will be room for more IPOs in Brazil.

1.3 Private Equity post-IPO returns

Regarding the influence of Private Equity investment and post-IPO returns, *Brav and Gompers (1997)* found that when returns are equally weighted, firms backed by venture capital outperform firms that are not PE-backed, over a period of five years after the IPO. Moreover, *Krishnan, Ivanov, Masulis, and Singh (2011)* found that the relationship between long-run

performance and IPOs backed by venture capital is positive and significant, since "more reputable VCs initially select better-quality firms, continuing to be associated with superior long-run performance".

In addition, *Cao and Lerner (2009)* found that in the three and five years after the IPO, not only PE-backed IPOs outperformed non-PE-backed IPOs but also the market as a whole.

Finally, it was found that if a company goes under restructure during the period when it is owned by a PE firm, it is very likely that its performance will be great since Private Equities may use management strategies to increase sales growth, thus leading to better stock returns *(Gluskin and Iskandar-Datta, 2015)*.

Hence, the general findings of the existing literature show that PE-Backed IPOs outperform the non-PE-Backed ones in the long-run.

2. Research Question and Hypothesis

This dissertation follows a deductive approach, since it starts with an existing framework of previous findings and theories, from which I will formulate my own hypothesis.

On the one hand, PE-backed firms are, on average, better than non-PE-backed firms due to the strategies used on the three forms of engineering, such as: (1) adding specific industry knowledge, (2) providing equity incentives to management teams and (3) maintaining a smaller board or cut company costs *(Gompers, Kaplan and Mukharlyamov, 2015)*. Megginson and Weiss (1991) found that "at the time of the IPO, markets react positively to the presence of PE investment". Thus, when PE backed firms go public, the price of the offerings reflect the market's expectations and so does the long-run stock's performance.

On the other hand, PE firms are usually criticized for its focus on short-term value creation and strong attention to their own profit generation by sacrificing long-run value creation, which opens the possibility that PE firms may not have a better long-run performance than non-PE-backed companies.

Since there are two possibilities, it is interesting to understand if after going public, PE-backed companies actually perform better than the non-PE-backed firms in Brazil. In case they do, it is important to understand what drives this overperformance.

Therefore, the hypothesis that I intend to test *is:* ***Private Equity investment positively affects the post-IPO performan*****ce**, which will then be rejected or not rejected.

3. Data and Methodology

In this chapter, I present the data and methodology used to develop the empirical study of this dissertation, describing the sample in both a quantitative and qualitative way as well as its collection process. In addition, in the methodology section, I explain my approach to the empirical results. Lastly, I present the regression model used and the independent variables chosen to run it.

3.1 Data

The initial set of IPOs was collected from Bloomberg's database – which covers daily market transactions and stores financial and corporate governance data – and comprises 108 Initial Public Offerings between 2005 and 2014 meeting the following criteria: (1) the offer stage is currently "Trading", (2) the offering only involved common stock, (3) the offer size (shares) was greater than 1 million and (4) all the information was disclosed for the three years after its IPO.

To collect the daily close prices of each security I have used Thomson Reuter's database.

In this sample, almost 75% of the companies had an offer size between €100M and €500M and 7% of them had an offer size between €1B and €10B. In addition, the sample is diversified in terms of industry sectors, such as: (1) Agriculture; (2) Business Support Services; (3) Construction; (4) Consumer Goods; (5) Energy; (6) Financial; (7) Healthcare; (8) Logistics and Transportations; (9) Real Estate; (10) Retail and (11) Technology, which can be seen in the table below.

Table 1. **Distribution of the sample by sector**

Sector	Number of IPOs	PE-Backed	Non-PE-Backed
Agriculture	5	4	1
Business Support Services	4	2	2
Construction	4	2	2
Consumer Goods	16	12	4
Energy	13	4	9
Financial	13	10	3
Healthcare	3	2	1
Logistics and Transportations	9	7	2
Real Estate	23	11	12
Retail	9	7	2
Technology	9	6	3
Total	**108**	**67**	**41**

IPO = Initial Public Offering, PE = Private Equity

Source: Author's computations.

From the table above, it is possible to verify that the sectors where more companies went public were "Real Estate", "Consumer Goods", "Energy" and "Financial". Moreover, the sectors that had more non-PE-Backed companies than PE-Backed companies going public were "Energy" and "Real Estate".

In addition, I have distributed the sample by year of occurrence of the IPO, as shown below.

Table 2. **Distribution of the sample by year**

Year of IPO	PE-Backed Firms	% of total	Non-PE-backed firms	% of total	Total IPOs	% of total
2005	6	5,56%	3	2,78%	9	8,33%
2006	12	11,11%	5	4,63%	17	15,74%
2007	30	27,78%	15	13,89%	45	41,67%
2008	2	1,85%	1	0,93%	3	2,78%
2009	2	1,85%	2	1,85%	4	3,70%
2010	3	2,78%	6	5,56%	9	8,33%
2011	8	7,41%	2	1,85%	10	9,26%
2012	2	1,85%	0	0,00%	2	1,85%
2013	2	1,85%	6	5,56%	8	7,41%
2014	0	0,00%	1	0,93%	1	0,93%
2005-2015	**67**	**62,04%**	**41**	**37,96%**	**108**	**100,00%**

IPO = Initial Public Offering, PE = Private Equity

Source: Author's computations.

One can verify that the distribution of IPOs is not evenly distributed over the 2005-2014 period. An interesting point is that 65,74% of the IPOs occurred until 2008 (beginning of the financial crisis), mostly due to the large number of IPOs in 2007 which accounted for more than 40% of the total. In addition, after the financial crisis, the number of initial public offerings dropped considerably with only 1 IPO in 2014 – the lowest number of occurrences per year.

Moreover, 67 IPOs from this sample were PE-backed (62,04%). However, only 17,59% of those have occurred after 2007, which reflects the declining trend after the financial crisis. In addition, it is interesting to verify that there were no PE-backed IPOs in the last year of the sample. On the other hand, there were 41 non-PE-backed IPOs (which accounted for 37,96% of the sample) and these have been occurring in every year, despite the low occurrences after 2012.

3.2 Methodology

To empirically study the post-IPO performance and compare the results between PE-backed and non-PE-backed IPOs, I have followed the approach proposed by Ritter (1991) in his paper "The long-run performance of Initial Public Offerings", which is detailed below.

3.2.1 Measures of long-run performance, statistical tests and regression models

Regarding the post-IPO performance, returns were calculated, statistical tests were performed and regressions were run, to ensure that the results were robust, thus giving statistical significance to the changes in the variables between years.

Since the goal is to understand if there is any particular event that affects the post-IPO performance, which in this study is the influence of Private Equity on companies before going public, two measures were used to evaluate the long-run performance: (1) a Buy and Hold strategy, in which two portfolios – one for PE-backed companies and another one for non-PE-backed companies – are created as the IPOs occur and the shares are not sold, while the total return is paid up at the end of the period studied and (2) calculate the Cumulative Abnormal Returns for the two portfolios for three years (36 months) after the IPO.

The main difference between the two methods is that the Cumulative Abnormal Returns accounts for market effects and the Buy and Hold strategy with Cumulative Returns, does not. Finally, I performed a regression for each year after the IPO to understand if the Cumulative Abnormal Returns can be explained by any of the explicative variables.

3.2.1.1 Buy and Hold strategy

The Buy and Hold strategy is a passive investment strategy where investors buy securities and hold them for an extended period of time, regardless of the market's fluctuation. *Ritter (1991)* used it to measure the return of stocks that were bought on the first day after the IPO and kept in the portfolio for 3 years, using as benchmark a portfolio of similar companies, in order to compare his results. As such, the first step was to build the two portfolios.

The returns used to measure the performance of the portfolios were calculated for four distinct intervals of time. The first one was the initial return period, also known as the first closing price, and the other three periods were the first, second and third years after the IPOs which is also known as the "after-market" period.

Hence, to calculate the daily returns, I applied the following equation:

$$R_{i,T} = ln\left(\frac{P_{i,T}}{P_{i,T-1}}\right) \qquad \textit{Equation 1}$$

Where:

$R_{i,T}$: Stock i return at time $_T$

$P_{i,T}$: Stock i closing price at time $_T$

$P_{i,T-1}$: Stock i closing price at time $_{T-1}$

Since one wants to know the difference between the portfolios' returns, it is important to calculate the daily returns of the portfolios. Thus, I considered both portfolios to be equally weighted and applied equation 2.

$$R_{p,T} = \sum_{i=1}^{N} w_i R_{i,T} \qquad \textit{Equation 2}$$

Where:

$R_{p,T}$: Return of the portfolio$_p$ at time $_T$

W_i: weight of the stock$_i$ in the portfolio

N: Number of stocks in the portfolio

Finally, to compute the Cumulative Returns of the two portfolios for different periods, I used the following equation:

$$CR_p = [\prod_{t=1}^{T}(1 + R_{p,T})] - 1 \qquad \textit{Equation 3}$$

Where:

CR_p: Cumulative portfolio return

$R_{p,T}$: Return of the portfolio at time T

3.2.1.2 Cumulative Abnormal Returns

The abnormal return is the difference between the stock return at time T (see equation 1 above) and the market index return for the same period, which in Brazil is the Ibovespa index.

$$AR_{i,T} = R_{i,T} - R_{m,T} \qquad \textit{Equation 4}$$

Where,

$AR_{i,T}$: Abnormal Return of $stock_i$ at time T

$R_{i,T}$: $Stock_i$ return at time T

$R_{m,T}$: Market index return at time T

Hence, the Cumulative Abnormal Return (CAR) can be calculated as:

$$CAR_{i,T} = \sum_{t=0}^{T} AR_{i,T} \qquad \textit{Equation 5}$$

Where,

$CAR_{i,T}$: Cumulative Abnormal Return of stock i at time T

In addition, to study the average CAR of the portfolios, I have followed the equation below:

$$\overline{CAR_t} = \frac{\sum_{t=0}^{T} CAR_{i,T}}{n} \qquad \textit{Equation 6}$$

Finally, I will test the CAR significance, using the t-stat. Here, the null hypothesis will be that the mean of the abnormal returns and the mean of the cumulative abnormal returns are equal to zero. The alternative hypothesis will be that the means are different than zero.

H0: $\overline{AR}_{i,t} = 0$ and $\overline{CAR}_T = 0$

H1: $\overline{AR}_{i,t} \neq 0$ and $\overline{CAR}_T \neq 0$

3.2.1.3 Regression Model

To understand what drives the differences in the Cumulative Abnormal Returns of the IPOs in Brazil between 2005 and 2014, I have run the following multiple linear regression with OLS for three different periods – 1 year, 2 years and 3 years – after the IPO:

$$\mathbf{CAR_t = \alpha + \beta_1\ PE + \beta_2\ Crisis + \beta_3\ Underpricing + \beta_4\ Log(\ MarketCap) + \epsilon_i} \quad \textit{Equation 7}$$

Where,

CAR_t: Cumulative Abnormal Returns. It is the dependent variable and is calculated as the sum of all abnormal returns on a portfolio at a certain time.

PE: Dummy variable that assigns the value of 1 if the IPO was PE-backed and 0 otherwise. It is expectable that this variable has a positive and significant effect on the dependent variable. Ritter (1991) divided his sample per industries but the results were not robust enough to conclude on the Private Equity's effect.

Crisis: Dummy variable that assigns the value of 1 if the IPO occurred before the financial crisis (2008) and 0 otherwise. One can see from the graphs above that most of the IPOs for this timespan occurred before the financial crisis. Thus, this drop in the quantities of IPO may also be related to the post-IPO performance. Eller (2012) found this variable to be positive and significant for the first three years after the IPO.

Underpricing: Independent variable which is a phenomenon verified in the the first closing day. It might be relevant since "IPOs tend to be underpriced by investment banks" *(Ritter, 1991)*. Moreover, through time, it is possible that the investors' high expectations may be readjusted which translates into a drop on the stock's price. Thus, it is expected that its coefficient will be negative. This variable is calculated as follows:

$$\text{Underpricing} = \frac{(\text{First Closing Price - Offer Price})}{\text{Offer Price}}$$

Log(Market Cap): Control variable that is the logarithm of the Market Capitalization of the companies on the IPO's day. The market capitalization can be defined as the price at which the

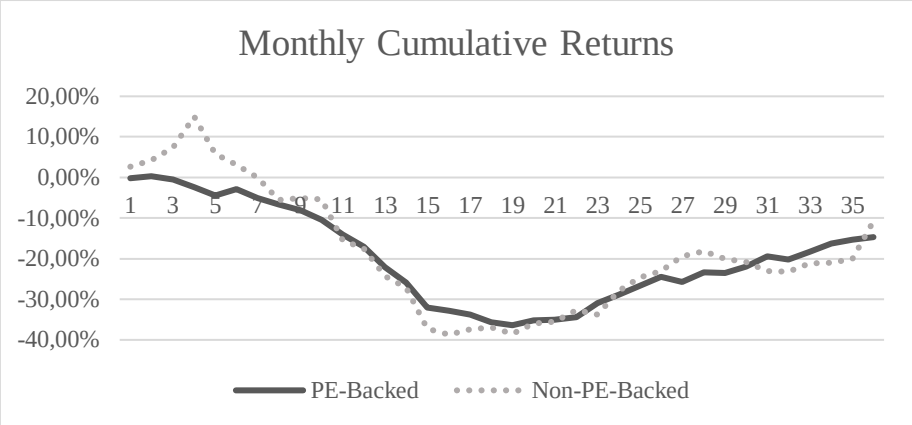
shares are sold in the first trading day times the number of shares of the company. Loughran and Ritter (1995) found a negative value for this variable's coefficient.

These independent variables were chosen based on previous similar researches, such as Ritter (1991) and Eller (2012), to understand what were the factors that drove the CAR performance.

4 Empirical Findings

4.1 Results of the Buy and Hold strategy

Graph 2. **Monthly cumulative returns of the two portfolios – PE-backed and Non-PE-Backed**



From the graph above, one can see that the trends of the cumulative returns of both portfolios are decreasing in the first eighteen months and increasing from that point onwards. Moreover, companies that were not PE-backed have slightly outperformed, on average, the PE-backed ones on the overall 3-year period after the IPO. In the end of the three-year time span, both portfolios had negative cumulative returns: the PE-backed portfolio lost 14,7% while the non-PE-backed portfolio's cumulative return was of -10,8%.

Regarding the non-PE-Backed portfolio, one can see that it has registered, on average, positive cumulative returns in the first six months after the IPO. During this time, the cumulative returns reached its highest value of 15,02% which is explained by the fact that in that period, the market had, on average, a positive performance for more than a week, leading to a growth of the cumulative returns that was higher than the "normal" performance. In addition, it reached its lowest value (-38,72%) after 16 months. This can be justified by the fact that most of the IPOs

in this sample have occurred in 2007 and sixteen months after it, occurred the financial crisis of 2008, which may be related to the stock price drop.

On the other hand, PE-Backed companies have had positive cumulative returns, on average, on the second month after the IPO, where its highest value (0,32%) was registered. From then on, the Cumulative Returns were negative (the lowest value was of -36,4% on the nineteenth month after the IPO) and its trend was very similar to the non-PE-Backed portfolio.

4.1.1 Descriptive statistics of the Cumulative Returns

The descriptive statistics of the Cumulative Returns of both portfolios can be seen below.

Table 3. **Descriptive Statistics of the Buy and Hold strategy's portfolios**

	PE-backed	**Non-PE-backed**
Mean	-19,56%	-18,40%
Median	-21,05%	-20,93%
Max	0,32%	15,02%
Min	-36,39%	-38,72%
Std. Deviation	0,1172	0,1509
Skewness	0,2421	0,5041
Kurtosis	-1,1470	-0,7048
Number of IPOs	67	41

Source: Author's computations

From the table above, one can conclude that the non-PE-backed portfolio was more volatile than the PE-Backed one, which makes sense since higher volatility should mean higher returns. Moreover, the non-PE-Backed portfolio have registered both the highest and the lowest cumulative returns on this sample.

In addition, it is interesting to verify that the average returns for both portfolios were negative, both at around -19%.

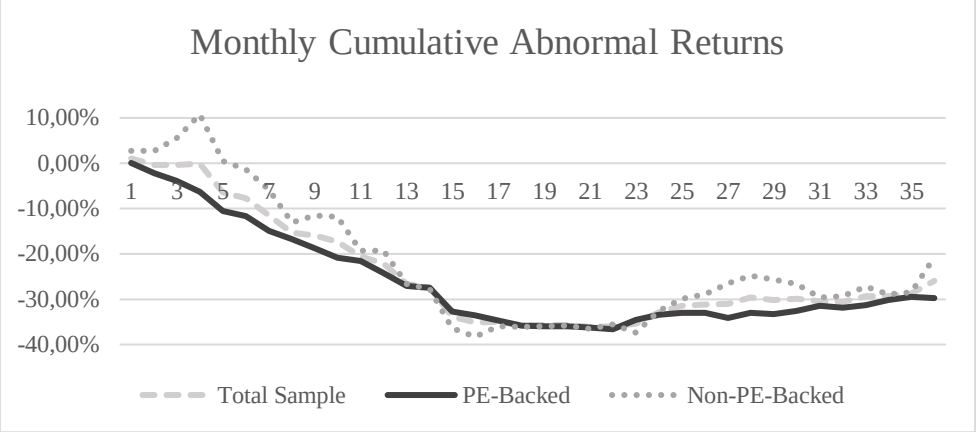
Regarding the statistical significance analysis of the sample, which was computed using the t-Test: Paired Two Sample for Means, the t Stat of the sample was -6,23, the t Critical was 1,96 and the P-value was 0. Thus, one can conclude that the samples have statistical significance at a 5% level, as seen below.

t-Test: Paired Two Sample for Means		
t Stat	t Critical	P-Value
-6,238347334	1,962967579	0

4.2 Results of the analysis of the Cumulative Abnormal Returns

To understand if the market effects accounted for the Cumulative Returns, I have analyzed the Cumulative Abnormal Returns for the first 3 years after the IPO. Moreover, the market index used to calculate the abnormal returns was the Brazilian one - IBOV index.

Graph 3. **Daily cumulative abnormal returns of the two portfolios and the market as a whole**



As one can observe, the shape of this graph is, in general, similar to the previous one, meaning that the market did not have much influence on the stock's overall performance.

Regarding the CAR, the non-PE-Backed portfolio has, once again, slightly outperformed the PE-Backed portfolio. However, in this case, the PE-Backed portfolio lost 29,7% of its value while the non-PE-backed portfolio's CAR was of -20,8% in the end of the third year after the IPO. In addition, regarding the total sample, the CAR was of -25,9%.

Moreover, the declining trend of the CAR in both portfolios in the first year and a half after the IPO is in accordance to previous studies, such as Eller (2012).

4.1.2 Descriptive statistics of the Cumulative Abnormal Returns

Below, one can find the descriptive statistics of the CAR variable for the total sample, PE-Backed sample and non-PE-backed sample for the first, second and third years after the IPO.

Table 4. **Descriptive statistics of the dependent variable – CAR - for all samples**

	CAR12 (1 Year)	**CAR24 (2 years)**	**CAR36 (3 years)**
Total Sample			
Mean	-9,71%	-21,75%	-24,43%
Median	-9,59%	-24,43%	-29,48%
Max	1,06%	1,06%	1,06%
Min	-22,20%	-36,10%	-36,10%
Std. Deviation	0,0855	0,1383	0,1188
Skewness	-0,0410	0,4485	1,0583
Kurtosis	-1,6273	-1,3474	-0,1691
Number of IPOs	108	108	108
PE-backed			
Mean	-12,64%	-23,16%	-26,08%
Median	-13,24%	-25,69%	-31,42%
Max	0,06%	0,06%	0,06%
Min	-24,28%	-36,63%	-36,63%
Std. Deviation	0,0818	0,1235	0,1089
Skewness	0,1923	0,5293	1,1620
Kurtosis	-1,3358	-1,1017	0,1239
Number of IPOs	67	67	67
Non-PE-Backed			
Mean	-5,00%	-19,80%	-22,28%
Median	-3,63%	-22,93%	-26,88%
Max	10,75%	10,75%	10,75%
Min	-19,27%	-38,28%	-38,28%
Std. Deviation	0,0993	0,1680	0,1415
Skewness	-0,0780	0,4142	0,9356
Kurtosis	-1,2305	-1,4008	-0,2853
Number of IPOs	41	41	41
t-Test: Paired Two Sample for Means	-6,2344	-3,0413	-4,8409

Source: Author's computations

As shown above, the CAR's mean of the non-PE-Backed portfolio was higher than the CAR's mean of the PE-Backed portfolio in the first, second and third years after the IPO. In addition, that portfolio was also more volatile in the same time span, which makes sense since usually more volatility means higher returns. Moreover, none of the distributions are normal since the skewness are not zero and the kurtosis are not equal to three.

The t-test for equal means was also performed for the three years in analysis and they are all significant at a 5% level.

The table below shows the descriptive statistics of the independent variables for all samples.

Table 5. **Descriptive statistics of the independent variables for all samples**

	PE	Crisis	Underpricing	Log(MarketCap)
Total Sample				
Mean	0,6204	0,6574	-0,25%	959,77%
Median	1	1	0,06%	941,49%
Max	1	1	8,36%	1250,47%
Min	0	0	-45,44%	786,09%
Std. Deviation	0,4876	0,4768	0,0517	0,8611
Number of IPOs	108	108	108	108
PE-backed				
Mean	1	0,7164	-0,23%	959,52%
Median	1	1	0,35%	941,98%
Max	1	1	8,36%	1250,47%
Min	1	0	-45,44%	839,84%
Std. Deviation	0	0,4541	0,0632	0,7272
Number of IPOs	67	67	67	67
Non-PE-Backed				
Mean	0	0,5610	-0,29%	960,19%
Median	0	1	0,04%	928,89%
Max	0	1	5,32%	1241,89%
Min	0	0	-5,32%	786,09%
Std. Deviation	0	0,5024	0,0236	1,0539
Number of IPOs	41	41	41	41

Source: Author's computations

As one can observe, the average Market Capitalization in the day of the IPO was very similar in the two portfolios, meaning that this phenomenon does not occur more often in a portfolio then in the other.

Regarding the “Crisis” variable, one can conclude that there were more PE-Backed companies going public before the financial crisis of 2008 since the number of IPOs is higher and so is the mean of this variable, when compared to the non-PE-Backed firms.

Finally, the “Underpricing” was the least volatile variable and its mean was negative in both portfolios, meaning that, on average, on the first closing price, both portfolios lost value.

4.3 Regressions' Results

To understand if Private Equity has significant impact on the Cumulative Abnormal Returns for one, two and three years after the IPO, I have run the regression presented above (Equation 7) and the results are shown below.

For the first year after the IPO (see table 6 in the attachments), the R^2 is not significant enough since it means that only 14,57% of the change in the dependent variable (CAR_{12}) is driven by the four independent variables. However, regarding the Significance-f, which should be less than 0.05, it was considered significant. In addition, the coefficients of the four variables were all extremely low, namely the Private Equity's coefficient, and the P-values were extremely big (with exception for Crisis variable) meaning that there is no statistical significance. Moreover, it is curious to observe that all the coefficients have the signal that was predicted in section 4.

Regarding the second year (see table 7 in the Attachments), the results are different than the first one: the R^2 increased to 23,66% and the Significance-F is 0. However, the coefficients are not significant since they are all close to 0 even though the P-value for the Crisis value is less than 0,05.

Finally, the conclusions of the third regression (see table 8 in the Attachments) are similar to the previous one. The coefficients of the variables are too small, despite the P-Value for Crisis and Log(Market CAP) are close to 0. Moreover, the Significance-F is almost 0 and the R^2 is 21,8%.

Hence, when analyzing the three regressions, one can see that they were not statistically significant, thus I cannot conclude anything regarding the influence of Private Equity in the long-run performance, nor explain what drives the changes in CAR through time.

5 Conclusions

This study intended to understand if the companies that were Private Equity-backed before going public had better long-run performance than the firms which were not PE-backed, in Brazil, between 2005 and 2014.

To analyse the post-IPO performance, two portfolios were built: one with PE-backed companies only and another one with non-PE-backed companies. Then, a "Buy and hold" strategy was performed to measure the Cumulative Returns of both portfolios and the Cumulative Abnormal Returns for the two portfolios were calculated. From these analysis, two main conclusions were drawn from this dissertation: oppositely to other studies, it was found that in Brazil, between 2004 and 2015, (1) it was indifferent if the IPOs were Private Equity-backed or not, regarding their long-run performance, since the CARs of both portfolios had values that were close to one another and (2) that in any case, in the three years after the IPO, the CARs were negative, meaning that both portfolios had considerable losses.

Moreover, to understand if Private Equity investment is related to the changes in the CAR, I performed a regression for each year after the IPO occurrence. However, the results were statistically insignificant in all three regressions.

Finally, the main obstacles for this study were (1) the low number of IPO occurrences in Brazil between 2005 and 2014, which in other markets, such as the European or the North American ones would have not been a problem and (2) the fact that when calculating the abnormal returns, I used the Ibovespa market index for all of the companies despite their industry sector. Thus, if I would have had access to the different industries market indexes, such as the "Índice de Consumo (ICON)", "Índice Financeiro (IFNC)" and the "Índice Imobiliário (IMOB)", it would have been more accurate and the returns may would have been different, leading to more detailed empirical results.

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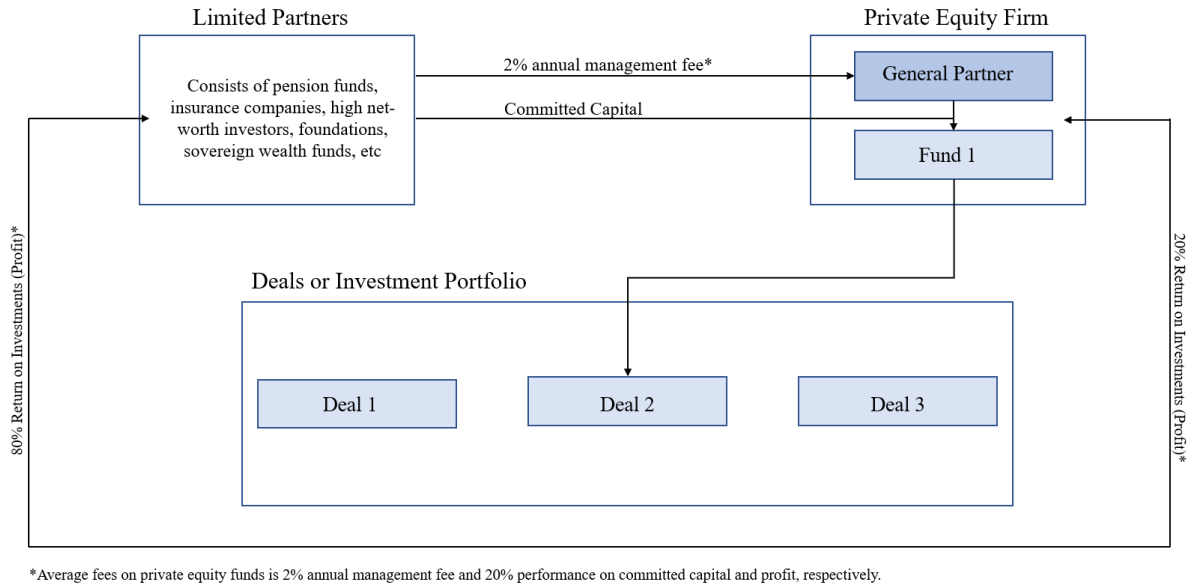
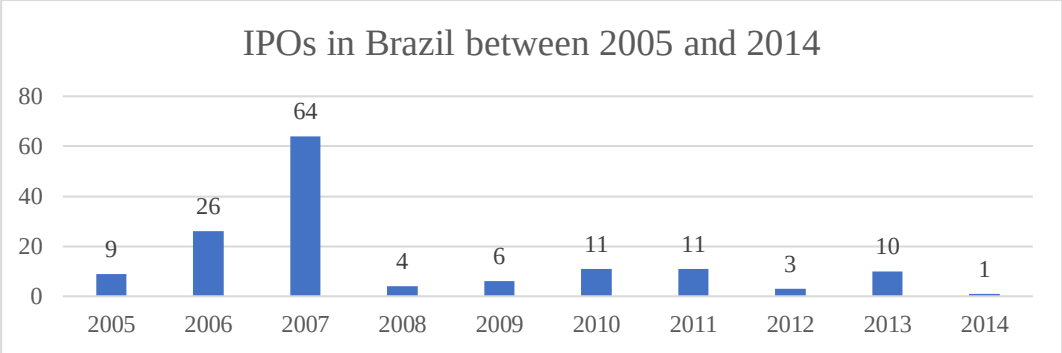
7 Attachments

Figure 1. **Typical Private Equity Structure**



Source: http://www.streetofwalls.com/finance-training-courses/private-equity-training/private-equity-industry-overview/

Graph 1. **Number of IPOs in Brazil between 2005 and 2014**



Source: BM&FBOVESPA

Table 6. **Regression of CAR_{12} (1 year after the IPO)**

SUMMARY
OUTPUT

Regression Statistics	
Multiple R	0,381769896
R Square	0,145748253
Adjusted R Square	0,112573428
Standard Error	0,787036344
Observations	108

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	10,88539727	2,721349318	4,393339008	0,002549176
Residual	103	63,80089933	0,619426207		
Total	107	74,6862966			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0,624210386	0,885563633	0,704873555	0,482479798
Private Equity	0,014938086	0,158101274	0,094484289	0,924908026
Crisis	-0,677047277	0,163162806	-4,1495197	6,87173E-05
Underpricing	-0,512499107	1,483808294	-0,345394421	0,73050226
Log(Market Cap)	-0,046485105	0,089646129	-0,518540011	0,605193771

Table 7. **Regression of CAR_{24} (2 years after the IPO)**

SUMMARY
OUTPUT

Regression Statistics	
Multiple R	0,48651723
R Square	0,236699015
Adjusted R Square	0,207056259
Standard Error	0,83924191
Observations	108

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	22,49635622	5,624089055	7,985054087	1,19972E-05
Residual	103	72,54567926	0,704326983		
Total	107	95,04203548			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1,852351362	0,944304694	1,961603467	0,052507753
Private Equity	0,061018771	0,168588421	0,361939277	0,718138895
Crisis	-0,959530763	0,173985694	-5,51499804	2,60331E-07
Underpricing	-0,320174586	1,582232022	-0,20235628	0,840037365
Log(Market Cap)	-0,169573693	0,095592522	-1,773922171	0,07903112

Table 8. **Regression of CAR_{36} (3 years after the IPO)**

SUMMARY
OUTPUT

Regression Statistics	
Multiple R	0,466851291
R Square	0,217950128
Adjusted R Square	0,187579259
Standard Error	0,810038973
Observations	108

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	18,83526494	4,708816234	7,176288887	3,87974E-05
Residual	103	67,5848032	0,656163138		
Total	107	86,42006814			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	3,504815062	0,911445908	3,845335232	0,000208728
Private Equity	-0,038130465	0,162722083	-0,234328764	0,81519492
Crisis	-0,690112806	0,167931548	-4,109488737	7,97787E-05
Underpricing	1,08684265	1,527175403	0,711668514	0,478278821
Log(Market Cap)	-0,345985064	0,092266207	-3,749856789	0,000292512

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